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Fractal Harmonic Field Theory - Volume II - Page 2: Theoretical Validation of delta^2 Curvature Framework

This page formalizes the mathematical model of light curvature as governed by the delta^2 entropy gradient field and confirms its compatibility with known physics and unified field models.

1. Redefining Refractive Index:

Let the local refractive index be defined as:

$n(x) = n_0 + alpha * delta^2(x)$

where:

- n(x): effective refractive index at location x
- alpha: coupling coefficient relating entropy field to optical properties
- delta^2(x): entropy field density at point x

2. Light Bending via Eikonal Equation:

Starting from geometric optics:

$d/ds [n(x) * dr/ds] = gradn(x)$

Substituting the entropy-coupled index:

$d/ds [(n_0 + alpha * delta^2(x)) * dr/ds] = alpha * graddelta^2(x)$

This gives a new form:

Curvature $kappa \sim alpha * |graddelta^2(x)| / n(x)$

3. Interpreting Push and Pull:

- Positive graddelta^2 (entropy increase) -> light diverges (push)

- Negative graddelta^2 (entropy decrease) -> light converges (pull)

- This directional curvature is recursive, not static

4. Compatibility with Unified Field Models:

- General relativity: light bends in spacetime curvature -> delta^2 reframes curvature as entropic memory field

- Thermodynamics: entropy as effect -> here, entropy is cause

- Electromagnetism: photon paths respond to gradn -> here, gradn is guided by entropy geometry

Conclusion:

The curvature of light as a function of delta^2 is mathematically valid and harmonizes with established physical frameworks. Recursive Dynamics offers a natural extension of unified field theory by identifying entropy curvature as the connective tissue of interaction.